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AN ESSAY UPON

DISEASE

ITS CAUSE AND PREVENTION

G. E. RICHMOND, M.D. (Lond.)

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BY

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'Mens sana in corpore sano.'

'Non divide et impera sed unitate impera.'

'He that giveth a cup of cold water in My name
shall in no wise lose his reward.'

LONDON
H. K. LEWIS, 136 GOWER STREET, W.C.
1907
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PREFACE

This little book must be considered as an essay, a suggestion, rather than a complete exposition of any of the subjects that it deals with. Its main object is to point out the very large number of diseases which are either spread by food or directly due to impurities found in articles of diet or articles in common use. The investigations upon which the remarks are based have extended over many years, and in many cases the articles containing the impurities have been taken repeatedly by the author, or by his patients, or friends, or acquaintances. The essay has been written rather hurriedly, and without the opportunity of reference to other medical works dealing with the same subject; there are many diseases omitted, which might have been included; and some of the inferences and conclusions drawn may appear to be made upon insufficient data, because space does not permit in so small a book to give always the precise details upon which the opinions are based. The cellular theory of disease seems to simplify some of the more complex problems, and to suggest very forcibly that all disease is preventible.

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DISEASE: ITS CAUSE AND PREVENTION

CHAPTER I

LIFE, HEALTH AND DISEASE

'Mens sana in corpore sano.'

In attacking such a complex problem as the meaning of Life on the one hand, or of its companions, Health and Disease, on the other, it is essential that at the outset we should simplify the task as much as possible. We must reduce the problem to its lowest terms. We must examine the minute structure of the body, and divide it up into the smallest component parts of which it is composed, and see how each of these component parts behaves during life, during health, and during disease.

The body consists of an aggregation of an innumerable host of cells, or minute atoms of living protoplasm, of an infinite variety of shapes and sizes as revealed by the microscope. Each cell has an independent existence and life-cycle of its own, and it is the aggregate result, or sum-total, of the lives of these cells which constitutes the life of the organism. Separate cells may, and in fact do, die by thousands every day, but they are immediately replaced by exactly similar cells, which have been gradually growing to maturity as the aged cells approached senility and death, and so the life and functions of the organism as a whole are not interfered with, but rather enriched by the accession of young and sturdy cells to replace the old and effete ones. Each cell reproduces its kind by a process of fission or simple division. Each cell during its existence passes through three stages—a preliminary or juvenile stage in which growth is active, but in which fission never takes place; a second stage in which the cell reaches its full growth, and in which it performs its special duties or functions with perfection; a third or senile stage in which its actions become more sluggish, and which paves the way for the final death of the individual cell which disintegrates and disappears. It is probable, from analogy with the known life-cycles of unicellular animals, that fission does not *normally* take place during the first and third periods, but only during the second stage—the stage of maturity— and probably towards the end of that period, thus allowing the cell to perform its functions for a sufficient period before fission reduces it to a stage of simple growth and inactivity. Each cell will have the power of making a certain number of fissions or cell-divisions, and a certain number only. Each cell, resulting from a process of fission or cell-division, may be regarded as a generation or descendant of the parent cell, and each parent cell will have the power of producing only a certain limited number of descendants or generations; and when this number has been reached, the cell will cease to divide normally, and the two cells resulting from the last cell-division, being unable to divide again, will merely live the span of existence allotted to each individual cell, and then die. In the earlier stages of the *life-cycle* of cells, growth and fission are vigorous and active, and generations are rapidly produced; they correspond to the period of the organism during which growth is the most marked feature. As the stages of the life-cycle advance, fission becomes less frequent, but each cell grows to its fullest perfection, and its functions are performed as perfectly as possible; it is during this period that the organism reaches maturity, and ultimately its prime of life, when the largest number of its component cells are at their most perfect growth or development. In the later stages of the life-cycle of the body cells fission becomes infrequent, and sometimes is but imperfectly performed, the resulting daughter-cells being sometimes mis-shaped or ill-formed, and the functions of the cell are but inadequately performed; finally fission ceases altogether, and the life-cycle of the cell is closed by the gradual decay and ultimate death of its last daughter-cells. These stages correspond to the senile stage of the organism, in which weakness and failing functions mark the closing scenes of the body politic.

The three stages of youth, maturity, senility, occurring in such well-marked contrast in the life of the organism as a whole, are seen to be but the echo or result of the same three stages that occur in the life-cycles of the generations of its component cells, which themselves reproduce the same three stages of growth in the shorter life-history of each individual cell. Hence the life of the organism is but the sum-total of the lives of the individual cells of which it is composed. Each cell is born, grows to maturity, reproduces another cell, and ultimately dies; but the life-cycle of the cell is carried on by the subsequent generations of that cell, and the life of the organism is carried on by the sum-total of the life-cycle of that cell and similar cells.

In childhood and youth the cells do not reach their *full* growth and maturity before they divide; hence it is probable that these cells, being immature, are more prone to be damaged by baneful influences, but, being able to divide with greater frequency, are better able to repair waste or damaged tissue by the quicker development of fresh cells. In childhood we certainly see a greater susceptibility to disease, but at the same time there is a marvellous reserve force present, which is capable of more quickly restoring the organism to a condition of health than in other stages of life. Childhood is distinguished by a greater susceptibility to injury or disease and a greater recuperative power than other periods of life. In manhood, the cells have reached their full growth and vigour. They are not readily attacked by disease, and show considerable powers of recuperation from injury, but do not recover with the same rapidity or ease as in childhood. This is the stage of great resistance and moderate recovery. In old age the cells have become weak and senile, fission occurs infrequently and imperfectly, hence this is a time of weakened resistance, great susceptibility, and slight power of recovery, which is often tedious and imperfect. The life of the organism, as reckoned by the sum-total of the vital energy of its component cells, reaches a lower and lower ebb until, finally, the tide recedes to 'that bourne from which no traveller returns,' and the organism ceases to be.

Now, Maupas has very clearly shown in the case of the life-cycles of many of the unicellular organisms (amœba and the Ciliata generally), that each cell or organism has the power of dividing only a limited number of times after conjugation has taken place, *i.e.* only a certain well-defined and limited number of generations or descendants can be produced from a single cell by fission, unless conjugation is allowed to take place again with another cell during the stage of maturity of each cell. These generations or descendants constitute what is called the *life-cycle* of the organism. The number of generations varies with each different species, but is fairly constant for the same species. A life-cycle commences with conjugation, and terminates with the last cell-division of which the last descendant is capable of making. At any time during the life-cycle of an organism, a new life-cycle could be commenced by allowing conjugation to take place between two mature cells, and would continue for the full number of generations of which that species was capable; and then death would take place.

The mature ovum may be regarded as a unicellular organism which, having conjugated with a spermatozoon, is capable of entering upon a life-cycle of cell-divisions or generations, which result in the growth of the human body. In the case of the unicellular organisms, the various daughter-cells at once disperse, and lead distinct and separate existences, whereas in the human body the various daughter-cells remain attached to one another, and by various processes become differentiated to form the various tissues of which the body is formed. Individual cells die, and are replaced by members or descendants of the same tissue cells, and this process would continue in the case of each organ or tissue, until the limit of the number of generations for that particular tissue or cell had been reached. There are many inaccuracies in this rough generalisation, but the principle of life-cycles can still be traced in the cells of the human body, although owing to great differentiation and specialisation certain cells are made to subordinate their functions for the service of other cells. For example, the number of nerve cells does not increase after they have been once formed, and they do not divide and replace injured or dead cells, as takes place in other tissues.

The minute structure of the cell is of little importance for the present. Each cell consists of a mass of protoplasm with a nucleus, and by its shape and size is sharply marked off from other cells forming different tissues. Certain cells closely resembling one another in form are arranged or grouped together, to form various tissues or organs. The chemical composition of each cell is of far more importance, and the structure of the cell may be taken as an index of its composition. Where the form of cells is identical the chemical composition will be identical, and where it differs from another cell there will be a difference in chemical composition of the living substances of which cells are composed. It is essential to realise that each variety of cell is as much differentiated by its chemical composition from every other variety of cell as it is by its structure and form. Difference in appearance means difference in chemical composition, and identity of form means identity of chemical composition, *e.g.* the chemical composition of all voluntary muscle fibres is identical, but is very different from that of bone cells, nerve cells, or gland cells. The chemical composition of cells forming the various tissues of the kidney will not be identical, and will differ very considerably from that of liver cells or cartilage cells.

What is the precise chemical composition of living matter is not known, and probably will never be known, because the only methods of examination at present in use require the tissue to be dead before it can be examined. It is possible to examine and determine the composition of substances from which the living cell builds itself up, and the composition of the products of decomposition of the living cell, or its waste products during life, and furthermore to determine the composition of the *dead* cell, and the various chemical substances that can be obtained from this dead cell. By these means it is possible to arrive at an *approximate* composition of any living cell, and further than this it is not possible to go. The composition of protoplasm is an extremely complex one, and the molecule probably contains an enormous number of atoms ; furthermore, it is extremely unstable and very liable to break down into simpler compounds, which would at once constitute a waste product, unless they could be utilised to build up the cell protoplasm again, under varying conditions. This very instability is the characteristic of living matter, and marks it off sharply from dead organic and inorganic substances. The protoplasmic substance is continually breaking down into simpler substances, and as constantly building itself up again from the materials supplied to it as food; whereas in dead organic matter decomposition alone takes place, there is no building up again. The greater the complexity of the chemical composition of a substance, the greater will be the number and variety of its possible decomposition products, according to the conditions under which a decomposition reaction takes place. It is this proximate chemical composition which varies with, and is the characteristic of, each variety of tissue cell. Only these cells which are identical in form and whose functions are identical will have had precisely the same proximate chemical composition. The instability and complexity of the chemical composition of protoplasm renders it liable to be affected by slight variations of conditions. The presence or absence of other substances may interfere with or prevent the usual process of building up, or hasten or retard or alter the process of breaking down, or may destroy the cell substance altogether. Most chemical reactions have an optimum temperature, at which they take place most readily; and should this temperature for any reason be altered, either the reaction may be altered, or may not take place at all or with great slowness. The laws which govern the chemical reactions of dead matter will apply equally to the more complex combinations which occur in the building up (anabolism) or breaking down (katabolism) of the protoplasmic chemical bodies of which living cells are composed. Just as some reactions are influenced by heat, in the same way others are influenced by the presence or absence of light, or of the chemically active rays outside the spectrum; and we shall see that some reactions of the body are influenced by these means.

Now, whenever a chemical reaction takes place, energy is either used up or is liberated. If the reaction requires the application of heat or the presence of light for its occurrence, it means that energy is derived from this source, and during the reaction the energy which is used will be stored up in the molecule and become available or potential energy, which can be liberated again when the complex body, under different conditions, is caused to break down into simpler component bodies. When a more complex organic body is produced from a simpler one energy is sometimes, but not always, required to bring about the chemical union, and when simpler bodies are produced by the decomposition of a complex body energy is almost invariably set free and appears as heat, light, motion, electricity, magnetism, sound, or force. In many instances the chemical affinity or attraction between two bodies is so strong that energy is liberated by their union, although a more complex body is the result; hence it is possible that there is a liberation of energy when the cell protoplasm unites with its food particles to build up the cell body. Besides the forms of energy mentioned above as resulting from ordinary chemical reactions, other forms of energy are produced in the reactions of the cell protoplasm, and appear as thought, nerve impulse, smell, taste, and perhaps touch.

The energy produced by chemical reactions is not always at once manifested at the time the reaction takes place, but may be stored up in the compound produced as *potential* or available energy, which may be liberated at some subsequent time when the compound breaks down into simpler substances, and appear as one of the apparent forms of energy enumerated above. The protoplasm of a cell is then stored with potential energy, which becomes manifest when its substance breaks down and appears as heat, movement, thought, etc. When a muscle cell breaks down, energy is liberated in the form of a contraction or movement of a muscle fibre, and the muscle fibre is said to perform its *function* of movement or contraction; when a nerve cell 'functions,' a nerve impulse is produced, resulting in a thought or a motor impulse; when a gland cell acts, or functions, its cell substance breaks down into a substance known as its secretion, such as milk or saliva. Hence the *function* of a cell may be defined as the *liberation of energy*, set free by the sudden breaking down of more or less of its cell substance. Cells may have a passive and active existence, and some cells merely have a passive existence. By a passive existence is meant that the cell merely slowly builds itself up from its food particles, and is slowly again disintegrated as the processes of its life proceed, but it never performs any active function and there is no sudden breaking down of its cell substances: instances of such cells are found in the fibrous cells of tendons, in bone cells, in red blood-corpuscles. It is evident that all living matter must have this passive existence, which merely means that the cell maintains itself alive; but, in addition to this passive existence, many cells have an active existence or the power of causing a sudden liberation of energy known as its function. Nerve cells, gland cells, muscle cells, motile cells, retinal cells, all possess this power of active existence, or power of performing some function in addition to the mere ability of keeping their cell alive.

Under normal conditions a given cell always performs its function in identically the same way, and the performance of a function is as characteristic of the cell as is its shape or appearance under the microscope. The function of a cell depends upon the liberation of a particular form of energy in a particular way, and this liberation of energy is dependent upon a particular chemical reaction taking place. Given that the same chemical reaction occurs under precisely similar conditions, then the same form of energy must always be liberated, and will cause the constant appearance of the same function again and again in the same cell. A cell cannot alter its function, unless it alters the way in which its active decomposition takes place, and it can only do this by altering the conditions under which the cell lives or under which the reaction occurs. Hence constancy of function means constancy of chemical composition of the cell; or, in other words, since under normal conditions the function of a cell does not change, it is evident that the chemical reaction giving rise to that function must be the same, and must result from the decomposition of a substance of a constant chemical composition. For example, the function of a muscle fibre is *always* a contraction of that fibre, because the function is always the result of the liberation of the same form of energy, and the energy liberated is always the same, because it arises from the same chemical reaction always taking place; and, since the same chemical reaction can only take place if the substance giving rise to it is the same, it is evident that the particular muscle fibre must have a constant chemical composition. And all muscle fibres which give rise to the same form of contraction will have identically the same chemical composition; hence all voluntary muscle fibres which contract in identically the same way will have an identical chemical composition. All nerve cells which give rise to the same nerve impulse will have the same composition; all gland cells giving rise to the same secretion do so because the chemical composition of the cells is identical; if their composition varied, their secretion would vary.

Hence we arrive at a law:

That **Constancy of Function** entails constancy of the chemical composition of the cell, or cells that have identical functions must have identical chemical compositions, and however slightly the function of a cell may vary from that of another cell, that variation of function under normal conditions always indicates a corresponding variation in the chemical composition of the cells.

Let us apply this law to a few of the tissues of the body.

In the muscular fibres of the body there are three well-defined types of fibres clearly marked off from one another by their form and shape, and just as sharply differentiated by the variations in their functions.

1. Voluntary Muscle Fibre.
2. Involuntary Muscle Fibre.
3. Cardiac Muscle Fibre.

The first variety is under the control of the will; the last two varieties are not; each type of fibre has its own particular method of performing its function of contraction.

Voluntary muscle fibres can make slow or rapid contractions at will, or the contraction may be continuous or tetanic. The whole muscle is usually involved when a single fibre contracts. Fatigue occurs after long use; it is slowly induced and slowly passes off.

Involuntary muscle fibres contract only slowly, and single fibres tend to contract producing peristaltic contractions of the muscular tissue instead of a contraction of all the fibres at once. Tetanic contraction is possible but not usual (*cf.* Hæmorrhagic Pancreatitis). Fatigue occurs after prolonged contraction.

Cardiac muscle.—Each contraction is sharp and sudden, and the contractions occur at rhythmic intervals; the rhythm may be altered slightly by nervous control. The whole muscle contracts at the same time. Fatigue does not occur in the same way as in case of voluntary and involuntary muscle fibres.

Tetanic contractions, not normal, may occur after death, or under abnormal conditions.

It is impossible for two contractions of cardiac muscle to take place without a well-marked interval occurring. It is possible that each contraction produces a condition corresponding to fatigue seen in voluntary muscle after prolonged action. Contraction and fatigue in cardiac muscle alternate with each action of the muscle. Fatigue is due either to an exhaustion of the muscle substance, capable of producing the contraction, or to the accumulation of waste inhibitory products. The rapid powerful contraction of cardiac muscle would correspond to a more or less total destruction of the contractile substance, which is slowly built up again during diastole, whilst the inhibitory waste product is being removed, by the circulation, or by further decomposition into a substance without inhibitory properties. Hence the cardiac action may be regarded as an intermittent tetanic action. This tetanic action of cardiac muscle is seen when the heart dies at the end of systole and the muscle remains in a contracted state.

Since the functions or contractions of the three different types of muscular tissue vary so much in their character, they must result as the effect of an equally different chemical reaction taking place. If the chemical reactions were identical, the types of contractions would be identical, because the same forms of energy would be given off in each instance. Therefore, the chemical compositions of three types of muscle fibre must be essentially different, and give rise to different chemical reactions during their decomposition, thereby liberating energy in a correspondingly different way, and so causing variations in the functions of the cells. Hence we see that the chemical composition of the three types of muscular cells is as variable as their functions and structure.

The kidney tubules are composed of several types of cells differing from one another markedly in appearance. It is known from the observations of the changes in the urine in certain pathological conditions of the kidneys that the secretions of these various types of cells vary. Hence, by analogy, we must conclude that their chemical composition likewise varies.

In the same way, since some nerve cells give rise by their active decomposition to a motor impulse, others to a thought, or a perception of light or sound, it becomes easy to foretell that the chemical compositions of these various nerve cells will vary just as their functions do.

Just as certain cells by their active decomposition produce energy which is transformed into some bodily action or function, such as thought, motor impulse, muscular contraction, or glandular secretion, so there are other cells which are capable of absorbing energy impressed upon them from without the body, and transforming this energy into a form which is capable of being appreciated by the cells of the body. The retinal cells are acted upon by the energy derived from light waves, and by their decomposition give rise to a nerve impulse, which is appreciated in the cells of the brain, and gives rise there to a thought, or perception of light. Sound waves in the same way have the power of causing a nerve impulse to start from the auditory apparatus—*i.e.* the energy of sound is transformed by the decomposition of the cells of the auditory apparatus into the energy of a nerve impulse, which gives rise to a thought or sensation of sound. The energy derived from a smart blow upon a nerve may be transformed into a nerve impulse producing a sensation of pain, if a sensory nerve is struck, or a motor impulse giving rise to the contraction of a muscle, if a motor nerve is struck. The energy derived from pressure (*i.e.* a modified blow) when acting upon the organs of touch is transformed by the composition of these organs into a sensation, or thought, of contact. Similarly, substances producing a thought, or sensation, of taste or smell, do so because they contain some substance which has the power of inducing an active decomposition of the chemical substances of which the taste bulbs or organs of smell are composed, and thereby setting free energy, which is transferred to the brain as a nerve impulse, giving rise to the sensations of taste or smell. These sensations will differ according to the different chemical reactions which are set up in the cells of the sense organs, which will react in different ways, corresponding to the difference in the chemical stimulus derived from the bodies giving rise to the smell or taste.

The complex protoplasmic substance of which these sense-organs are composed, although it has a definite and constant chemical composition, has the power of breaking down into a large variety of decomposition products, each one of which will have the power of setting up its own particular nervous impulse, and thus giving rise to a corresponding variety of tastes or smells. For example, all acids produce a similar decomposition of the taste bulbs, and give rise to a similar sensation of sourness in each case; all sugary bodies cause a different decomposition product, which, setting free a different form of energy to the acid decomposition, gives rise to a nervous impulse, that causes a totally different sensation in the brain cells of sweetness. The sensation experienced depends upon the form of energy which is liberated from the sense organ, and which then acts upon the cells of the brain. The same stimulus always sets up the same train of sensation, and different stimuli set up different sensations, the sensations varying with the stimuli, whether the stimulus consists of the varied colours acting upon the retinal cells, or the various tastes, or smells, acting upon their respective sense organs. These varied sensations form a striking instance how, in health, the same complex cell substance can break down in different ways, and give rise to different forms of energy, owing to the presence or absence of different substances, or forms of energy acting upon them. Given the *same conditions*, the *same decomposition* always takes place, and gives rise to the same function or excitation; but alter the conditions, and a different reaction at once takes place, producing a corresponding variation in the energy set free and the sensation produced. It is important to realise this variation in health of the function of a cell due to the varying conditions under which it occurs, as it will be seen later on that pathological conditions may interfere with cell functions in a similar way.

Besides, considering the functions of cells, it is necessary to consider the bodies which result from the decomposition of the cell substance. All living cells are in a continual state of change, they are continually building up fresh material into their cell substance, and this substance is as continually breaking down into simpler bodies or waste products. These waste products are continually being produced even during the resting stage of a cell, and during the active or functioning stage of the cells waste products of a different kind, and in greater quantity, are produced. All classes of living cells produce these waste products, but it is the waste products produced during the active function of the cell that are of the most importance, because they often possess the power of influencing the cell which produced them, or other cells. Any substance resulting from the decomposition of cell protoplasm may be regarded as a waste product. In the case of a contracting muscle fibre it is a true waste product, and tends to hinder or prevent further contraction and to poison the cell. In the case of glandular bodies these waste products constitute their secretion, and in duct glands they are removed from the vicinity of the cells by being stored in receptacles or extruded upon a free surface through the duct. In ductless glands, such as the thyroid, they are absorbed into the circulation, and have been shown to have the power of influencing the functions of other cells. The waste products of cells which are absorbed into the circulation are known as internal secretions, and since all cells produce waste products, all cells may be looked upon as having potential internal secretions. The waste product of a muscular contraction is as much an internal secretion as that of the thyroid, and it is possible that it may have the power of producing the tired feeling which results in the muscular tissues of the body after the prolonged active exertion of only a few muscles, by tending to hinder or prevent the contraction of other muscles. Most glands which have an external secretion are believed to have also an internal secretion, often of very active properties. Such glands as the kidneys, spleen, testicles, and ovaries, are believed to have these active internal secretions. An internal secretion is, then, the decomposition product of a cell, which is absorbed into the circulation, and may or may not have active properties capable of acting upon other cells. The internal secretion of the thyroid has properties which are capable of influencing the circulation, and in disease of this organ we find circulatory disturbances as one of the evidences of the diseased condition. There is an internal secretion of the gravid uterus, which has the power of influencing the condition of the breasts and nipples, besides causing the deposition of pigment in certain cells of the body.

Health and Disease

So far it has been shown that the life of the organism is but the expression of the sum-totals of the lives of its constituent cells, and some account has been given of the functions and characteristics of these cells under normal conditions or conditions of health. Now, the organism may exist either in a state of health or disease, and we must define what is meant by these terms.

The organism may be said to be in a state of perfect **Health** when each one of its component cells performs its functions perfectly, and conversely

Disease may be defined as a condition in which the function of certain cells of the body is disturbed, or in which the usual chemical reactions of the cells do not take place, giving rise to the production of abnormal forms of energy or function, and abnormal waste products or internal secretions.

Disease is subdivided into two sections:

1. Functional Disease.
2. Organic Disease.

By **Functional Disease** is meant a condition in which certain cells of the body, owing to abnormal conditions, perform their functions imperfectly; but these cells are not permanently injured, and as soon as the abnormal conditions are removed they are capable of returning to a healthy state and of once again performing their functions perfectly.

By **Organic Disease** is understood a condition in which certain cells of the body have been so injured, that they show evidences of this injury when examined under the microscope by obvious differences in their structure. Such organic injury may be permanent or may be possible of recovery. All cases of organic disease will cause an interference with the due performance of the function of the cell diseased, and hence organic disease will always entail functional disease; and conditions giving rise to functional disease may, if long continued, cause organic disease.

Functional disease can only be caused by the presence of abnormal conditions in the vicinity of the cell. For, by our definition, there is no gross lesion of the cell itself, and hence it can only be by the influence of conditions external to the cell that its function can be interfered with. Such conditions may arise from:

1. Abnormal temperature.
2. Toxins or poisons in the blood.
3. Abnormal internal secretions.
4. Absence of any of the normal constituents of its food.
5. Absence of a sufficient supply of fluid.
6. Interference with the blood supply of cell.
7. Interference with the nerve supply of cell.

Functional Disease may be subdivided into two sections.

(*a*) Primary.

(*b*) Secondary.

In **Primary** Functional Disease there will be a disordered function of a cell or class of cells, which is actually due to abnormal conditions which affect only that particular class of cells, and which do not arise from abnormal conditions existing in other parts of the body.

Such a condition can only be due to causes 1, 2, 4, 5, enumerated above.

For example, the nervousness of excessive tea-drinkers is clearly due to a poison or toxin absorbed from the tea, which interferes with the proper function or chemical reactions of certain nerve cells, rendering them either hypersensitive to small stimuli, or preventing them performing their functions in the usual way.

Alcohol frequently causes functional disturbance of the cerebral cells, interfering with, or even totally suspending, their action.

Excessive sweating may be caused by pilocarpine affecting and increasing the function of the sweat glands.

In **Secondary** Functional Disease there is a functional disturbance of a class of cells, caused by conditions which arise from functional or organic disease of other parts of the body.

The functional disturbances arising from pyrexia from the absorption of the abnormal products or toxins of diseased cells, from the presence of abnormal internal secretions, or of an excess of these bodies, from abnormal nervous control or blood supply of a region of the body, will all be secondary functional diseases due to disturbances arising in diseased situations remote from the cells involved.

The delirium or stupor of acute pyrexial diseases is a secondary functional disease of certain cerebral cells, due to the toxins circulating in the blood.

Nervous Polyuria or Diarrhœa is a functional disease of the kidney or bowel, secondary to disordered nervous control.

Similarly the flow of saliva which occurs at the sight of any one sucking a lemon is a functional disease of the salivary gland, secondary to disordered nervous control.

Nervous pallor of the skin or ‘cold sweats,’ are similar instances of disordered nervous control.

The Cardiac disturbances found in disease of the thyroid are functional disturbances of the heart, possibly caused by internal secretions of that body acting probably through the nervous mechanism.

The pigmentation of the skin seen in gravid women is a functional disease of the epidermal cells, due to internal secretions arising in the gravid uterus.

The profuse sweats of the phthisical are functional disturbances of the sweat gland, due to the toxins circulating in the blood and arising in the course of the disease.

The instances of secondary functional disease might be extended very largely, but a sufficient number has been given for the purpose of example.

Functional Disease may arise either from a disordered action of the cell in question, or from the function of the cell being performed in excess, or from the function being diminished, or even actually suspended.

E.g. the function of certain cerebral cells is to originate thoughts or ideas.

If the function of the cells is disordered, the resulting thoughts or ideas will be abnormal and would give rise to delusions or illusions, a condition corresponding to an unusual or disordered decomposition of the cell substance.

If the function is excessive, thoughts will crowd upon one another with unusual rapidity, a condition corresponding to an unusually rapid decomposition of the cell substance, but not necessarily a disordered decomposition.

If the function is diminished, the cell substance does not break down with its usual ease, and there is a paucity of ideas or diminished power of thought. If the cell function does not take place at all, there is an absence of thought and a condition of unconsciousness results.

The delusions of delirium tremens and the delirium of pneumonia are instances of disordered action of the cerebral cells. The sparkling humour of the convivialist is an instance of excessive function of the cerebrum, due to the influence of certain toxins circulating in his blood and stimulating the cells to excessive activity.

The muddle-headedness and diminished thinking-power, or actual coma, of the drunkard are well-known results of excessive drinking, and are instances of diminished or suspended action of the cerebral cells.

Now, in all the above cases we see instances of an altered cell function, due to poisons circulating in the blood. The alteration of the function of the cell is clearly due entirely to the poisons, for before they were brought into contact with the cell, it performed its function normally, and on their removal it is capable of again performing them normally. The cell itself is not altered, but the decompositions of its cell substance are interfered with; in some instances the decompositions are abnormal, in others excessive, or diminished or absent. Moreover, unless these poisons had reached the cell it would have continued to perform its function regularly and perfectly, and the interference with its function is due entirely to the presence of the poisons. So it is with every cell of the body; what is true of the function of one cell is true of all cells, and this leads to the law of **Permanency of Function.**

It may be stated thus:

Every cell in the organism will continue to perform its function normally, unless some influence or poison is brought to bear upon it, which interferes with the usual decomposition of its cell substance.

If this law is true in cases of functional disease it will be true also in organic disease, where the cell is actually damaged in structure. A cell, under normal conditions, can no more alter its function than a river can run uphill, or a stone fail to return to the earth. If its function is altered, then it is altered because some influence outside itself has acted upon it.

Mania is but the excited and disordered action of the cerebral cells, just as an impossibility of originating thoughts or imbecility is the effect of an absence of the usual cell reactions which normally produce thought. Motion is the outward and visible sign of the normal action or function of a motor nerve cell ; convulsions result from an exaggerated action of that cell, paresis from a diminished action, and paralysis arises from an inability of that cell to perform its function. 'Cramps' are but the convulsive or tetanic action of certain muscles supplied by certain nerves, and are due to a disordered function of the cells from which those nerves arise. These conditions may be due either to functional or organic disease of the cells. When functional it is evident that the disordered action must have some cause, and that cause can frequently be found in some toxin which has been taken in the food or drink, or which arises from abnormal processes taking place in other parts of the body.

All cells have a certain recuperative power from injury inflicted upon them, but injuries frequently repeated may lead to organic disease or permanent injury of the cells, and hence a disease which is at first only functional, may lead to permanent derangement and organic disease of the cells. In the complex conditions arising in diseases of the body, many possible causes of functional derangement of the cells may exist, and two or more of the causes enumerated above may act at the same time, and it may be difficult or impossible to define to what extent each factor may contribute to the disturbance caused in any particular cell under discussion. Whether or not a particular cell will be damaged or deranged by a particular toxin or poison circulating in the blood will depend primarily upon—

1. The particular chemical composition of that cell, but also upon whether the cell has had its resistance diminished by any of the following conditions.
2. Previous injury or disease.
3. Diseased nervous supply.
4. Its susceptibility to other damaging influences, such as an exposed position upon the body.

Organic Disease

Much that has been stated in reference to functional disease applies equally to organic disease. The main points of distinction have been stated to be that, in organic disease, in addition to derangement of function, there exists some structural deformity of the cell protoplasm. Hence the science of Pathology can point out after death the precise position and extent of the organic lesions present, and thus greatly assist in clearing away the mists that shroud the cause of disease in general. Organic disease is sometimes Primary, and sometimes Secondary.

A typical example of Primary Organic Disease is found in a cutaneous wound or disease of the nerve cells.

A typical example of Secondary Organic Disease is the degeneration which occurs in the skin, or in joints, or in muscles, as a result of disease of the nerves supplying these parts.

For a cell to become diseased it must be exposed to some influence, which disturbs the conditions under which it exists normally. These disturbing influences will vary in character according to its position of exposure or otherwise in the body. An injury may arise from any of the following causes:—

1. Mechanical violence, such as blows, cuts, sprains. The cells on the surface of the body will most frequently be exposed, but on consideration it is seen that almost any cell may suffer, if the violence is only sufficiently great and goes deep enough. A joint or a tendon may be twisted or sprained or over-stretched.

2. The chemical or other irritants in the atmosphere (gases, vapours, dust, bacilli, etc.). The tissues of the respiratory tract would be most prone to suffer from these causes, but there are many other cells exposed to attack.

3. The chemical or other irritants of food or drink. Here the first tissues liable to be injured would be those of the alimentary tract, but after absorption into the

blood any tissue may be injured. These toxins are probably the most common causes of disease.

But the blood may absorb gases from the lungs, or gases or liquids from the bowels or alimentary tract, and after absorption they would be capable of attacking any cell in the body.

4. Heat, cold, and light, if intense, may cause injury to tissues exposed to their influence; *e.g.* burns, frost-bite, blisters by rays of sun.

5. The absence of any constituent necessary for the life of the cell from the air, food, or drink. (*Cf.* Scurvy, Rickets.)

6. The failure to maintain a healthy regimen of body cells; *e.g.* by exercise, cleanliness, regularity, etc.

7. Interference with nerve or blood supply of cell.

If any cell in the body is attacked by a toxin or poison causing organic disease, it is plain that every cell of the same chemical constitution exposed to the same conditions must likewise be attacked. Instances of this universal spread of disease to cells of one class is seen in many cases; *e.g.*—

Skin ..	.. General eczema. Ichthyosis.
Hair ..	.. General alopecia. Grey hair.
Blood ..	.. Anæmia. Scurvy.
Bones ..	.. Rickets.
Nerves ..	.. Peripheral neuritis.
Nerve Cells	.. Widespread degeneration of cell groups.
Heart ..	.. Cardiac muscle.

Voluntary Muscles	Wasting in paralysis, in typhoid fever.
Thyroid	Goitre.
Salivary Gland	Mumps.
Peyer's Patches	Typhoid fever.
Ulceration of Intestine ..	Dysentery (esp. colon).
Liver	Cirrhosis.
Kidney	Nephritis.
Lungs	Pneumonia. Phthisis.
Adrenals ..	Addison's Disease.
Joints	Osteo arthritis. Rheumatism.

All diseases must have a beginning, and the precise conditions that determine which are the first cell or cells to be attacked must be very varied, such as blood supply, abnormal pressure, position, age of cell, whether it is at the growing end of a bone for example.

But the ultimate spread of the disease to all the cells of a similar chemical composition in the above examples is very significant, and probably points to the presence of some toxin or poison capable of attacking all cells of that particular class. That the composition of cells varies at different periods of their growth, is well seen in the case of bone cells, which differ markedly at the young growing end, where fresh cells are being repeatedly formed by fission, from those found in the older calcareous parts of the bone. Now, it is well recognised that rickets is a disease due to improper food, and this difference in the composition of the bone cells explains why the young growing cells are attacked, and not the older mature cells. It is clear that the requirements of an actively growing cell would be different to those of an older calcareous one, and that this cell would first experience distress from any lack of a proper food supply.

The reason why phthisis generally attacks the apices and pneumonia the bases of the lungs has never been explained absolutely; but it seems possible that the variations in the blood supply of the two regions may explain it. The apices would, owing to gravity, tend to have less blood in them than the bases, and as phthisis is a disease which spreads with very little increase in the blood supply of the part attacked, whereas pneumonia is characterised by an enormous engorgement of the tissues with blood, and even by extravasation, there is at least *prima facie* evidence that difference of blood supply influences the two diseases.

Such minute differences as these would influence the chemical composition of the cell protoplasm, and this difference in the composition would at least be sufficient to determine the cells to be first attacked by any toxin capable of influencing that particular class of cell. A similar influence upon the distribution of disease is seen in the manner in which gouty manifestations tend to attack non-vascular tissues.

It has been shown that the chemical composition of cardiac and voluntary muscular tissue must differ, owing to the differences in their functions; hence it is not at all surprising to find that certain toxins will pick out, with unerring precision, cardiac muscle, rather than voluntary muscle, and that, *post mortem*, the heart alone may show evidences of degeneration. Similarly in muscular rheumatism it is the voluntary muscles that show evidences of functional disturbance, and not the cardiac muscle.

The very obvious differences in the composition between liver cells and nerve cells, or between the cells of joint membranes and of the thyroid gland, or hair cells and the adrenals, will very easily explain why a toxin which was capable of damaging the one might be quite incapable of influencing the other. It is this difference in chemical composition which protects the cells of one organ, or tissue, from attack, and which renders the cells of another organ vulnerable to the effects of a toxin, although that toxin circulating in the blood bathes equally the cells of every tissue in the body.

That the toxin contained in the blood is the cause of many diseases, is proved by the fact that by their *internal situation* the only avenue of approach for any deleterious influence is by the blood-current, either directly or through the influence of nervous disease. There is absolutely no other channel whereby disease can reach cells which are not situated either externally or along some tract which has a free opening to the exterior, such as the respiratory, or alimentary, or genito-urinary tracts. For example, bone-cell disease in rickets, all nervous diseases, all diseases of all ductless glands, and all joint diseases, must have their disease brought to them by the blood stream. Again, since many of these diseases have no connection with bacteria whatsoever, the toxin must either be absorbed from the lungs or alimentary tract, or arise in some focus of disease elsewhere in the body; and frequently no such focus exists. Hence we are driven to the conclusion that the toxin is either absorbed as a gas from the lungs, or is absorbed from the alimentary tract as a liquid or a gas, for gaseous substances in the intestines are capable of absorption, and may be again exhaled in the breath from the lungs. That some such toxin must be present in the blood in these cases is proved by the fact that every cell would continue to maintain a healthy state if the conditions under which it existed remained normal. Moreover, in many instances the source of the disease has been actually traced to some article of diet, such as alcohol, in cases of cirrhosis of the liver, of nephritis, or in many cases of nerve disease of the brain and cord, or to impure water in the case of goitre, or to impure food in the case of rickets. And since bacteria are quite absent, and at no time complicate these diseases by their presence, the one and only source of the disease must be the toxin absorbed from the alcohol or diet.

The Rôle of Bacteria in Disease

The fact that there are a large number of diseases in which bacteria play no part raises the question as to the precise rôle they play in those diseases in which they are found. In life, bacteria are found most often, and perhaps most typically, in wounds, abscesses, sloughs, ulcerating surfaces. Although they attack the meninges of the brain and cord, they are not present in diseases of nerve cells and nerves themselves, unless necrosis takes place and an abscess is formed, as in abscess of the brain. In all the situations in which bacilli occur, the cells are found dead, or dying, or damaged; and, since pathogenic bacteria are found upon healthy tissues without causing harm, it is highly probable that these germs are *incapable* of attacking healthy cells, and can only gain a nidus amongst cells that have been previously damaged by other means. As soon as the body dies, all its tissues at once swarm with bacteria, whilst during life the cells were able to repel their attacks. This places bacteria in the position of scavengers, which devour damaged cells, rather than the active causes of disease in the first instance. But, having gained a nidus, it is quite possible that, by the absorption of their toxins, they are able to aggravate and increase the amount of disease present, and possibly in the later stages the body may suffer more from the absorption of their toxins than it did by the primary cause of the disease. Yet it is an important point to raise, that bacteria can only attack cells already injured by some other means, for it throws back the causation of disease one step behind the bacteria. In the case of the tubercle bacillus it was found that, in experiments upon rabbits, only those joints which were previously injured became tubercular. Then again, some explanation is required why phthisis sometimes proves fatal in a few weeks or months, and at other times takes many years to bring about a fatal result. If the tubercle bacillus were solely responsible there would surely be some closer agreement in the results of its invasion of the lung tissue. It seems far more likely that phthisis is caused by some other unknown toxin, and that the tubercle bacillus merely grafts itself on as a scavenger upon the damaged cells. What that toxin is, it is at present impossible to say: it may possibly be some irritant gas in the atmosphere, or it may be some toxin brought by the blood stream.

There is a tendency to consider the typhoid germ to be a degenerate form of the Bacillus Coli, and not a distinct species itself—a belief which arises from the relation existing between the properties of the two bacilli, and from the fact that a series of intermediate forms, which connect the two forms of bacilli, are known to exist. Hence it is possible that typhoid fever arises, first, as the result of the action of a toxin in the alimentary canal, which injures the Peyer's patches, and then secondarily converts the Bacillus Coli into the Bacillus Typhosus. It is important to remember that water which is capable of spreading typhoid fever frequently does not contain the bacillus; in the Maidstone epidemic, which was traced to the impure water supply, the germ was never isolated from the water.

Then again, the frequency with which abscess of the brain occurs in the temporo-sphenoidal lobe, or cerebellum, is very remarkable. It looks as if the cells in these lobes were of such a chemical composition that their necrosis could be caused by certain toxins in the blood, and that secondarily these dead cells were attacked by bacteria. The abscess generally contains foul-smelling putrefactive bacteria, which are only found to be present amongst dead cells.

Hence it is probable that bacteria are not the prime originators of disease, but that they may aggravate and increase any injury already existing, and that their presence is of diagnostic value, but may not be the true cause of the disease in which they occur. Indeed, some forms of bacteria have actually been proved to assist, rather than hinder, the healing processes of wounds and ulcers. In hæmorrhagic pancreatitis, no bacteria are found in the areas of necrosis, although they occur elsewhere in the same tissue arranged in groups or isolated patches. Here the bacteria are probably repelled by achemiotaxis, and, as they are not present in the actual lesions, they probably do not cause them, but are simply collecting in the neighbourhood in their rôle of scavengers, to devour and clear away the necrotic tissue.

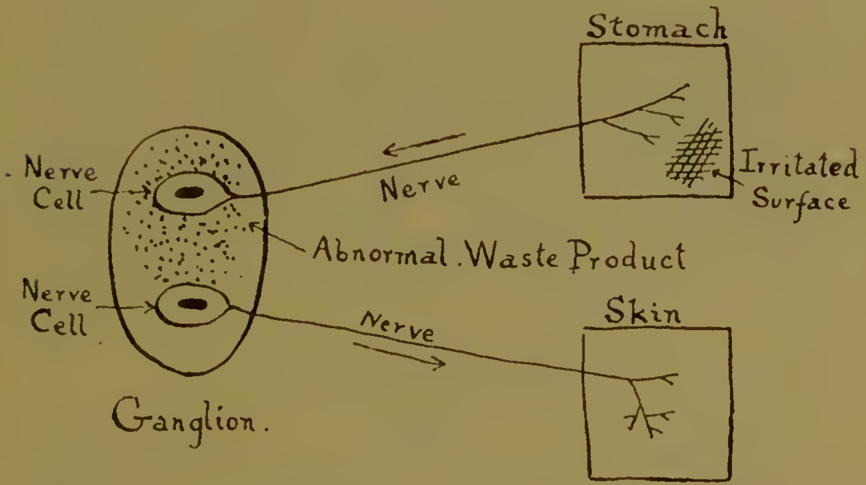
Now, it frequently happens that only very small portions or tracts of a particular tissue or organ are diseased, whilst the greater number of the cells which have an identical chemical composition escape any damage. For example, in herpes only a very small tract of the epidermis is affected, and in gout frequently only one joint is affected; or a disease may be one-sided instead of symmetrical, as in spinal curvature.

When small tracts only are affected, it will generally be found that the extent of the lesion corresponds to the distribution of a particular nerve or nerves, and, on further examination, it will be found that the nerves or their nerve cells are diseased. It is well-known that the nutrition of cells depends upon the integrity of the nerves that supply them, and an injury to a nerve may be the occasion of a lesion of a joint, or the skin, or both. Frequently the blood-vessels and therefore the blood supply is interfered with by disease, and may determine the precise point at which a disease starts in any particular instance; *e.g.* gout is much influenced by the condition of vascularity of tissues.

One-sided lesions are sometimes induced, owing to an irritation being set up in some organ on that side of the body. The irritation of the nerves of the stomach set up a sensation of pain in the back, because the stimulus from the stomach irritates the nerves going to the back. This arises from an abnormal waste product being produced by the abnormal stimulus from the stomach, which, bathing the cells in the vicinity, irritates them, and gives a sensation of pain in the region of their distribution. That abnormal or varying stimuli are capable of altering the reactions of cell decompositions has been already seen, in the case of the varying results obtained by the action of different substances upon the taste bulbs.

Spinal curvature on the left side is generally preceded by the pain of dyspepsia in the back. This pain then becomes more severe, and spreads upwards and downwards, until the whole of the muscles on that side of the body are tender and painful, when a contraction occurs. If this condition persisted, the muscles on the painful side would degenerate, and a condition of asymmetry or spinal curvature result. Hence spinal curvature is probably produced by a toxin which, when swallowed, sets up irritation of the stomach, and then irritation of the nerve ganglia, but being a different toxin to that producing herpes, it affects the motor nerves supplying the muscles of the back.

Other causes which determine a particular seat of disease are injury, such as a blow, a sprain, or excessive use or the reverse, but these are but probably the initial injuries which determine the position in which a disease begins.



The age of the patient is of great importance. For, as age increases, certain organs slowly develop, whilst others disappear; *e.g.* the thymus gland disappears soon after birth, whereas the testicles and ovaries take many years before they arrive at maturity. The bones do not cease growing until the age of twenty-one years is reached. Hence at different ages, cells vary in their stage of development, which is another way of stating that their chemical composition varies with the age of the organism. It is easy, therefore, to see why a toxin will be harmful at one age, and harmless at another, or harmful to one set of cells and not to another, although they are both closely allied in structure. The presence or absence, or maturity or otherwise, of any organ will decide whether or not its internal secretion is present in the blood, and this will decide its influence upon certain cells of the organism.

The absence of the thyroid is capable of producing a condition of cretinism, a state in which the bodily structure is so profoundly affected that the result is seen in stunted stature and a deficiency of brain power.

CONCLUSIONS

Life

The life of the organism is the expression of the sum-totals of the lives of its separate cells; it goes through the same stages of growth, and is limited by the number of generations or divisions that the fertilised ovum is capable of making.

The chemical composition of the protoplasm of each class of cell is constant.

The functions of cells are constant, and depend upon a definite chemical reaction taking place, and liberating energy.

Difference in the function of two cells points to a difference in their chemical composition.

All cells produce waste products, which are known as internal secretions, where they are absorbed into the circulation, and have active properties.

Health and Disease

Health is a condition in which all the cells of the body perform their functions perfectly.

Disease is a condition in which the function of certain cells is disturbed, or in which the usual chemical decompositions of the cells do not take place, giving rise to the production of abnormal forms of energy or function, and abnormal waste products or internal secretions.

Functions of cells can be disturbed by poisons or toxins circulating in the blood, and absorbed from the food, or drink, or air.

A cell cannot of itself alter its function ; unless some influence or poison is brought to bear upon it, which interferes with the usual decomposition of its cell substance, it will continue to perform its function normally.

An injury to a nerve or nerve cells interferes with the function of the cells to which the nerve is distributed.

Areas and tracts of disease are generally due to nerve injury ; bacteria probably play only a secondary rôle in disease, attacking only injured tissues, and then perhaps causing poisoning by the absorption of their own toxins.

It is highly probable that all disease is preventible, and death should only normally occur in extreme old age.

CHAPTER II

INFLUENCE OF DIET AND ENVIRONMENT ON DISEASE

The history of medicine is commenced in the Bible. For we are informed in its pages that certain plagues were sent upon the people, the plague of boils and blains and the plague of hæmorrhoids. Then certain tribes are spoken of as eating 'defiled' bread, and at another time it is recorded that certain wells were poisoned. Then the first glimmerings of preventive medicine are seen in the command which forbad the Jews to eat pork, to leave the place where the wells were poisoned, and to eat unleavened bread. Then, later on, Christ came with His healing cup of cold water, wherewith to wash away the poisons that were destroying the cells of the body. Wine is frequently mentioned in the Bible as having the power of disturbing the power of thought and lessening the will power.

It is something like six thousand years since these plagues were sent upon the people, and yet to-day hundreds of people suffer from hæmorrhoids, and boils, and blains, and innumerable other diseases, for which little in the way of cure can be done, but for the prevention of which every effort ought to be put forth. Surgery removes but does not cure a disease, and when a disease is cured by 'medicine,' it is cured more by the efforts of nature and the removal of the cause than by anything else.

All the zymotic diseases have at one time or another been traced to milk, water, or some other article of diet. In other words, we can say that diet contains some toxin or poison, which is the cause of zymotic disease. It is easy to see that such a disease would be liable to spread to all the members of a family who consumed such food, and who happened to be of a susceptible age. Now, in many of the zymotic diseases no bacterial origin has been found ; hence we are thrown back upon the assumption that it is due to some toxin or poison contained in the food. No bacteria have been isolated for scarlet fever, German measles, chicken-pox, measles, typhus fever, or whooping-cough ; but bacteria have been associated with typhoid, diphtheria, and, possibly, small-pox. But doubt has already been thrown upon the authenticity of the typhoid bacillus as a cause of typhoid, and the Klebs-Lœffler bacillus and Hoffman's bacillus have been shown to be interchangeable, and as one is admittedly harmless, it is more than probable that diphtheria will follow the lead of typhoid fever, and the cause be referred back to some toxin which is the real primary cause of the disease.

All endemic diseases, such as goitre, calculus, are clearly due to the conditions existing in the district in which they are prevalent, and disappear if the person affected resides in another district. Goitre has been conclusively shown to be due to an impure water supply by the disappearance of goitre and cretinism from a town in France when a pure water supply from a neighbouring healthy town was introduced in the place of its former impure supply. Members of a goitrous family who leave the district lose their goitre.

All epidemic diseases are probably due to impurities in the common articles of diet—water, milk, meat, bread, vegetables, or the atmosphere we breathe.

The enormous number of diseases which have been traced to alcohol prove that toxins or poisons contained in this substance have a most potent power to produce disease, such as insanity, epilepsy, diseases of motor nerves of spinal cord, peripheral neuritis, cirrhosis of liver, granular kidney, joint diseases, diseases of blood vessels.

Much of the neurotic and hysterical conditions amongst women, irritability of temper, palpitations, and irregularities of heart's action are due to toxins contained in tea, butter, etc., etc.

Butter, coffee, milk, contain poisons acting upon the heart, and sometimes a poison which produces great muscular and nervous prostration, rendering all active exertion almost impossible.

The 'cankers' produced in the mouth are due to some irritating substance in the food, and if introduced into the stomach would probably be able to cause perforating gastric ulcer.

Coldness of the hands and feet and chilblains in children are due to a substance contained in water or food, sometimes bread; other substances cause a burning irritation of hands and feet.

Boils and carbuncles have been caused by diet, such as fish or bacon. Dyspepsia, flatulence, pyrosis, caused by vegetables or fruit, or other acticles of diet, belching or hiccoughs by tobacco, or sponge cakes, etc., etc.

Appendicitis is certainly due to some substance contained in food, which acts upon the appendix.

Rheumatism, aches and pains in the back, lumbago, pains in the joints, elbows, and knees, are certainly caused by diet.

Toothache in decayed teeth can be caused by tobacco, if nerve is exposed, or by meat, and some forms of meat are specially apt to cause decay of the teeth.

Hæmorrhage from the bowel and stomach, hæmorrhoids, bearing-down pains, or tenesmus of rectum, can all be caused by diet or alcohol.

Conjunctivitis, suffusion of eyeballs, tinea tarsi, caused by diet, and in all probability errors of refraction, and increase of ocular tension and buphthalmos.

Blindness by tobacco.

Nasal discharge, discharge from turbinals, discharge from naso-pharynx, and bronchitis, can all be caused by diet.

Ringing in the ears, deafness, catarrh of middle ear, and pain in the ears, deficiency of wax, excess of wax, can all be caused by such articles of diet as cheese and bread, etc.

Asthma is probably due to substance in some article of food or drink. It disappears if people change their residence or leave a district.

Neuralgia caused by milk, etc.

Anæmia, pernicious anæmia, leucocythæmia, probably also due to articles of diet. Scurvy certainly due to diet.

Hyperæmia and hæmorrhagic rashes of the skin are sometimes caused by fish or bacon.

Many of the toxins or poisonous ethers contained in alcoholic beverages have a special power of influencing the reactions of brain cells and nerve cells generally.

The Influence of Toxins upon the Brain and Nerve Cells

The brain is the seat of the mind, and contains centres for the reception of impressions received by the senses from without, together with other centres regulating voluntarily or automatically the machinery of the body.

Now, the mind needs very careful analysis. It contains an enormous number of nerve cells, which are intimately connected together by nerves which form dendrites around the cells they communicate with. There are present in the mind several well-marked and quite distinct powers which are probably located in different areas.

1. *Perception or Mental Acuteness.*—The power of grasping the *meaning* of ideas, of actions, or of events.

2. *Imagination.*—The power of originating thoughts or ideas oneself, apart from outside suggestion.

3. *Memory.*—The power of recalling past events.

4. *Will Power.*—The power to make a decision.

5. *Reasoning.*—The power of comparing one mental perception with another. Probably connected with the next power or faculty.

6. *Pleasure (or the reverse, Sadness).*—Closely connected with the muscles of expression—smiling, laughter, crying. It is a distinct sense or faculty, and is closely connected with reasoning, that idea which causes the greatest sense of pleasure being considered the best.

7. *Philoprogenitiveness, or Love of the Opposite Sex.*—These cells are roused into function by the society of the opposite sex, and receive impressions from many sources, including the lower animal centres in the spinal cord.

From these fundamental faculties all the processes of the mind can be explained.

Wit, humour, repartee, would be due to the exercise of the imagination in a pleasant vein, repartee entailing a quick perception of what is said to one in addition.

Interference with the will power would lead to a kind of hypnotic state, in which the person acted almost automatically to any suggestion that was made to him, either by word or action, with great diminution of will power, or decision.

Memory is quite distinct from mental acuteness ; either faculty may be impaired without the other being affected.

The faculty of pleasure is seen to excess in some imbeciles, who are inordinately pleased with everything and everybody. It is seen disorganised in melancholia. In the exaggerated ideas of grandeur in general paralysis it is probably over-excited.

Sleep is probably the resting-stage of the cells connected with the mind, and probably closely analogous to fatigue in muscle cells. During this period the cells are engaged in anabolic processes only, and with the removal of waste matters accumulated during mental activity or katabolism.

Now, alcohol is capable of upsetting and interfering with each one of these mental faculties.

It can cause the loss of mental acuteness or perception, causing confusion of thought, an inability of grasping the precise meaning of anything, making the brains seem 'like water.'

It can cause loss of memory, both for recent events and events of long ago, whilst the effect lasts. But the memory may recover after the effect of the alcohol has ceased.

It can destroy the will power, rendering a person liable to carry out any suggestion that is made, however absurd. (*Cf.* Hypnotism.)

It can cause loss of imagination or the power of originating ideas, of thinking. The mind seems a blank and there is great difficulty in originating any idea.

It can destroy the reasoning faculty, so that one cannot form a judgment or opinion.

It can excite the pleasure faculty, inducing laughter at slight provocation, a sense of well-being and happiness; or

It can depress the pleasure faculty, causing a lachrymose condition; or a perverted condition, or action, or function of these cells is seen in a combative condition.

It can also excite mental activity temporarily, or may derange this faculty, causing illusions (things seen upside down).

It can also temporarily excite the imagination or derange it in delirium tremens, causing the delusions of blue devils.

Sleeplessness can be induced by alcohol and by other articles of diet, and by smoking. The sleeplessness of smoking is a strange weariness of the brain, in which there is a great desire for sleep but no power of procuring it. There is a sense of weight and uneasiness about the head. It is a weary vigil.

Sleeplessness of alcohol is often accompanied by a throbbing of the vessels of the brain and in the ears, with some cardiac irregularity and uneasiness. There is also a sleeplessness in which the brain is very clear; there is a great wakefulness and no desire for sleep, no uneasy feeling of any kind but merely an inability to sleep.

There may also be a buzzing or dizziness of the brain which prevents sleep.

Alcohol may also *induce* sleep, which may pass on to coma, a condition of profound unconsciousness, from which no ordinary stimulus can rouse the patient. This condition of coma may prove fatal, if unrelieved.

Some forms of coal sometimes give off a gas which has the power of affecting the reactions of the brain cells, rendering the mental perception and reasoning powers defective.

Catalepsy can be induced by toxins or poisons contained in some articles of diet (tapioca, *e.g.*).

In catalepsy there is a deficiency of will control of the muscles of the body, producing an inability to originate any movement, or to suspend the action of a muscle once contracted. Hence the body remains in any position, in which it is placed, and there is no power of altering that position. A person may have the desire to perform some action, but no power to carry it into execution; *e.g.* such a person would sit before a meal without eating it; unless some one else actually fed him. Such a condition is capable of slow and gradual recovery, but a curious condition of delayed cerebration may remain behind. On asking such a person a question, there is at first no response; but on waiting a few seconds or a minute, perhaps, or on repeating the question, an answer is given quite normally, showing that there is no actual damage to the cells receiving the question, but a delay in its transmission and in formulating the reply. The mental reflex arc is interfered with. Hence, since the cells can act normally, but their reply is delayed, it is highly probable that, in catalepsy, we are dealing with an injury to the dendrites, through which the messages are sent, rather than an injury to the cells themselves. There is thus a cerebral reflex arc, just as there is a muscular reflex arc. A similar explanation could be given to the loss of mental control over the muscular action of the body. It is interesting to note that the memory in a case of catalepsy may remain quite perfect.

In peripheral neuritis the nerve fibres are attacked, sometimes both motor and sensory varieties, and it is thus an example of a process similar to that of catalepsy, but attacking the lower set of nerves from the spinal cord to the periphery, instead of those from the brain to the spinal cord. Now, the function of a cell which sends a message to another nerve cell would differ from that of a nerve cell which sends a message to a muscle, or receives one from the sense organs, since in the one case we are dealing with pure nerve impulse between two nerve cells, whereas in the other we are sending a message which is required to stimulate a muscle, or receive an impression, which has to be changed to a nerve impulse. Clearly the form of energy must vary in these cases.

Now, since the function is different, it is clear that the composition of the higher set of nerve cells which only exchange nerve impulses with other nerves will differ from that of nerve cells which are in communication with muscles, etc. And, since the composition of the cells vary, it is highly probable that the composition of their fibres will also vary with them. Hence it is easy to understand why some toxins, or poisons, will attack the upper set of nerve cells and their fibres and dendrites, and another toxin will attack the lower set. The composition of the cells of the brain differs from that of the cells of the spinal cord, because their functions are essentially different, and a toxin which is capable of attacking one set of fibres and cells might be quite incapable of attacking the other. Just in the same way a toxin which was capable of attacking a motor nerve cell, might be quite impossible of damaging a sensory cell, or a sensory end organ, owing to the difference in their chemical composition, which is so clearly pointed out by the difference in their functions, or the form of energy liberated by their decomposition. For example, there is a toxin sometimes present in some forms of cheese which causes a ringing in the ears, and which may set up catarrh of the middle ear, and ultimately deafness, but it has no effect upon the auditory nerve itself, nor upon any other nerve.

There are substances which are capable of producing great irritability of the disposition ; it is comparable with the combative stage of drunkenness, and is probably a higher nerve centre poison. This condition is not the same as a great irritability of the "nerves" in which slight stimuli, such as noises or loud talking, cause an unusual excitement. This condition probably corresponds to an excessive excitability of the reception centres, and it is sometimes accompanied by a sensation that the muscles are just on the point of making movements or an excitable condition of the motor nerves. It is as if the motor and sensory cells were 'on edge.' It is probably a condition in which the cell substance of the affected cells is in such a condition that it breaks down more readily than at other times. Such a toxin might, in excess, produce a convulsion, but in small quantities might only increase the excitability of the cell substance to decomposition. Such a toxin is the cause of epileptic seizures and convulsions.

The toxic theory of insanity would explain why, in so many cases, no pathological lesions are found, beyond perhaps some slight alteration in the appearance of some of the cells of the brain.

Too much stress cannot be laid upon the essential difference in composition and function which exists in the higher nerve centres and their nerves, and the lower nerve centres and their nerves. The higher centres control nerve centres only, and their function is to send messages capable of influencing nerve cells only; whereas the lower centres send messages capable of influencing a muscle or a gland, or receive messages from the sense organs or the skin. It is easy to realise that a different form of message or energy would be required to cause a muscle to contract, or a gland to secrete, and it is this difference in the function or energy exhibited which entails a difference in the chemical decomposition giving rise to it, and therefore of the chemical composition of the cell substance which breaks down, and gives rise to the energy. Now, in certain diseases we find the higher centres alone attacked, and in other diseases the lower centres. It is well known that peripheral neuritis can be caused by certain poisons, without any corresponding disease in other nervous tissues. Hence it is not difficult to argue by induction that there are possibly poisons which are capable of injuring the nerves of the higher centres, and which would prevent their impulses passing to the lower centres, producing a condition exactly analogous to peripheral neuritis, which is a disease of the lower nerve centres. Such a poison is, probably, the cause of catalepsy, which cuts off the higher control of the muscular tissues. It is the difference in the chemical composition of the protoplasm of the two classes of nerve centres, which determines whether or not a toxin will be capable of attacking one set or the other.

It is highly probable that all functional nervous disorders, such as hysteria, are due to some toxin circulating in the blood, which either directly excites, or interferes with, the action of certain nerve centres directly, or indirectly, by acting upon some other organ, such as the testicle or ovary, etc., and causing the production of an abnormal internal secretion of that organ. The age and sex of the person would greatly influence the amount of disturbance caused. And clearly the amount of any article of diet containing an impurity, which was taken by any person, would determine the amount of disturbance caused to health, and if small quantities only were taken, no serious disturbance might ensue. This helps to explain why some members of a family are attacked, whilst others escape illness. Such toxins are frequently found in tea or other articles of diet, such as meat. Blushing is probably due to the influence of some such internal secretion. It is certainly quite different to the flush, which is habitually present upon some faces, although a flush may be but the permanent state of a passing blush.

People who take stimulants frequently suffer from a shakiness of the hands, a coarse tremor, which is very noticeable when an attempt is made to keep the hands quiet and steady. It is, without doubt, due to the prolonged action of the alcohol upon the muscular nervous control.

It is possible by certain toxins to actually influence and rouse certain thoughts in the brain. Under the influence of alcohol, objects seem inclined or inverted, instead of upright, or seem to be actually reversed, or tottering and shaky. This illusion may be induced again and again, by repeating the dose of alcohol. In delirium tremens, there is an appearance of small, moving objects, which seem very real to the person suffering from the delusion, and this delusion is constantly repeated when the conditions are repeated. There is, in these two instances, an example of actually influencing the thoughts of the brain, by the administration of alcohol, and these thoughts can be induced at will, by giving a sufficiency of that particular form of alcohol which induced them previously.

In the delirium of the acute diseases, the unconscious mind wanders, and often expresses its thoughts in rambling words. In some instances, animals are the theme that occupies the mind, and in other instances it is some absorbing trouble or joy that occupies the mind. It is possible that certain toxins have the power of calling up certain ideas. Certain it is that people have stated that at certain times of their lives they have experienced either great liking or dislike of animal pets, and in others their minds have been filled with thoughts of animals, although no animals were present to suggest these thoughts. It is possible that the same toxin which influences the thoughts in delirium has influenced them at these times, for there is no effect without a cause, and the same effect generally follows the same cause.

The particular group of cells which are attacked would depend sometimes upon the blood supply. A poison which was capable of attacking a large number of cells, if present in small quantities in the blood, would probably attack those cells which were in constant use, because more blood containing the poison would be attracted to those cells which were in active use. Hence it is perhaps that people who write a great deal are most prone to suffer from writer's cramp, and great speakers from hoarseness, or what is known as clergyman's throat.

Night terrors in children, and nightmare in older people, are probably the result of diet.

The toxins or poisons which are capable of injuring the higher centres of the brain are often of a gaseous or ethereal nature, for they can escape into the air of a room from a burning fire, and cause great indistinctness of thought, and confusion of mind; but such fumes do not affect the lower centres, which are always affected by some toxin contained in food or drink. This is the reason that, in asylums, the patients are encouraged to work in the open air.

Apart from foreign toxins or poisons in food or drink, it is essential to remember that every cell of the body produces its own waste products, that often act as poisons to the cell that generates them, and may exert an influence upon other cells. The waste product of a muscular contraction tends to produce fatigue of that muscle cell, and may possibly exert a slightly fatiguing influence upon all similar muscular tissues. Internal secretions of glands exert an active influence upon cells far distant from them; hence it is necessary to keep up the circulation of healthy blood, that these products may be removed and excreted by the proper channels, and fresh food material supplied. For this purpose a healthy regimen of life is requisite; good, wholesome diet, fresh air, exercise, cleanliness, regular habits and a sufficiency of rest and sleep are the main factors in this regimen.

The diet should be wholesome and pure, free from all adulterations or antiseptics of any kind whatsoever. It should be varied, and taken in sufficient quantities, and at regular intervals. Ordinary diet should not contain 'stimulating' properties, as they are liable in this case to be taken in excess.

Fresh air is important for the removal of gaseous impurities from the blood, and for the storage of the blood with a supply of oxgyen. Exercise stimulates the circulation, and tends to stimulate excretion of waste products, by increasing the activity of the excretory channels, including the sweat glands of skin, which are important avenues of excretion.

Cleanliness and bathing keep the skin in an active condition, and so increase the eliminative powers of this by no means unimportant channel.

Regularity of habits is of great importance, waste products retained in the bowels tend to decompose, and the products of their decomposition are absorbed from the intestine.

During rest and sleep the products of activity are removed, and the cell builds itself up again from the food supplied by the blood.

Pure water is one of the best means of eliminating toxins and poisons from the body, and in cases of illness it should be taken for this purpose; should the water be impure, it may be distilled if necessary.

The Relation of Diet to Disease

It is not easy to apportion the amount of blame that must be attached to the various articles of diet in the causation of disease, because it depends upon the particular impurity which happens to be present and the particular article of diet in which it happens to occur.

Perhaps *alcohol* stands first in the number and multiplicity of the diseases which it is capable of causing. As a nerve poison it easily stands first, and its influence in causing disease of the liver, kidneys, joints, blood-vessels, render it a most dangerous article of consumption.

Milk.—So many epidemics have been spread by milk that it is a most dangerous article, and should be most carefully watched. Tuberculosis in children is said to always begin in the alimentary tract, and it has been attributed to the milk they take. Sometimes milk contains nerve poisons also (*cf.* Neuralgia, Sleeplessness, etc.).

Meat.—Liable to putrefaction and decomposition. Contains many 'stimulating' poisons or toxins. May cause decay of teeth, diarrhœa, ptomaine poisoning, etc., etc.

Fish.—Typhoid has frequently been traced to oysters and also fish; boils also caused by fish.

Bread.—By no means above suspicion. Some epidemics may possibly be due to poisons or toxins in bread, although the process of baking excludes a large number. Coldness of hands and feet frequently due to bread.

Butter, frequently adulterated, contains toxins producing cardiac distress, high tension pulse, sleeplessness, etc.

Cheese.—Contains a long list of poisons. Headache, ringing in the ears, deafness, etc.

Fruit and Vegetables.—Some varieties harmless, others at other times produce dyspepsia, flatulence, pyrosis, foul breath, etc. Some oranges contain cardiac depressing toxin.

Tea.—Principally nerve poisons of functional type. Hysteria, 'nerves,' sleeplessness, cardiac distress, etc., etc.

Coffee.—Heart poisons, nerve prostration, muscular weakness, etc.

Sugar.—By no means free from suspicion ; may contain arsenic, as in outbreak of paralysis at Manchester.

Water.—Often the cause of epidemics because of its general use.

Tobacco.—Heart, ringing in the ears, nerve poisons, pigmentation and bronzing of skin, grey hairs (?), blindness, anæmia, etc.

Nothing like a complete list has been given of the various toxins and poisons contained in food ; it is rather an indication that care is required in watching the various articles of diet, as a source of many of the diseases that flesh is heir to. It is quite certain that no disease ever occurs without a definite cause, and that cause is generally in the articles of diet. When so many diseases are *known* to be caused by food, it is not unreasonable to suggest that all diseases will be found to have some definite and preventible cause. It is for the medical profession to knit themselves together and combat that cause, and it is the duty of the people to support the medical profession, not only whilst they do it, but after they have done it, if so be they are successful in their efforts.

CHAPTER III

FUNCTIONAL DISEASES AND THEIR CAUSES

No longer is disease looked upon as a visitation of God, as it used to be in the Dark Ages, for the light of knowledge has lit up the caves of ignorance, and Science, with its ever-watchful eye and inquiring mind, has sought out the causes of disease, and history has recorded the discoveries one by one. The climbing of the mount of knowledge has been an arduous and often a very perilous task. Sage after sage has spent his life in the climb, and departed; but he has left behind him some little scrap of knowledge, with which he has carved upon the steep cliff of Ignorance a tiny step for the use of succeeding sages, or may be succeeding ages, in their ascent. But the progress has been an exceeding slow one, and often the steps have been destroyed, or have crumbled away to dust, or have been falsely cut. But now through the mists of gloom and suffering the summit of the peak is in sight, and all gaze at it with wonder and awe, for planted firmly upon its highest point is a silken flag, floating out upon the breeze, and on it is wrought in letters of red and gold one word—in an unknown tongue.

The history of disease is not written as clearly in the text-books of Science as it is carved upon the bodies of the living and the dead. Individuals, families, clans, villages, towns, countries, continents, nations—in fact, the world at large carry with them some of the pages of the history of disease. Those who run may read, but the *auri sacra fames* glitters and dazzles the eyes of men, and they grope their way onwards in darkness and in suffering. Their loved ones die and are mourned and forgotten. But the history of their disease lives after them, and the ghosts of the departed call for fresh efforts to fight against the advancing hosts of sickness and death.

The first real step of progress was made by the study of anatomy, or the structure of the body. Then came the microscope and the study of Histology, or the minute structure of the healthy cell. This was followed by the study of Physiology, or the functions and compositions of the body cells in health. Then, by comparison, the study of Pathology showed how these cells differed in structure and function in disease. These are the stepping-stones across the river of Disease. Now it is necessary to search diligently for the cause of these changes and construct a history of the ætiology of disease, for no effect is without a cause. Sometimes the cause is found in one article of diet and at other times in another, the same cause occurring in different articles, and different causes occurring in the same articles. But by a process of elimination it is easy to track down the article which is the *origo mali*. But so frequent is adulteration in food that it frequently happens that another article is found adulterated as soon as one is rejected. It is stated that 10 per cent. of the samples of milk taken are found to be adulterated. This shows that the machinery of our public health barriers are inadequate to the strain thrown upon them.

Let the attention rest for a time upon some of the functional diseases that are so common. No functional disturbance can occur unless some cells of the body meet with unusual conditions, which interfere with the proper function or exhibition of energy of that cell.

Hysteria commonly occurs amongst young unmarried women, but sometimes in men. In some cases it is accompanied by leucorrhœa, and some of the effects are due to the circulation of an excessive abnormal internal secretion of the ovary. Such nervous effects as blushing or nervousness are closely associated with ovarian disturbances. Now, leucorrhœa in women corresponds to a clear mucous discharge from the meatus in men, and in both cases this is caused by certain substances in the diet capable of acting upon the uterus or prostatic gland and producing a mucous discharge. It is possible that this substance may exert an influence upon the nervous tissues in addition to its local action. This discharge can be induced at will, and is discontinued when the articles of diet causing it are not taken.

'Nerves' or neurotic dispositions are frequently caused by certain varieties of tea. People obtain their tea from the same source for years, and naturally suffer from the same conditions of nervous derangement without ever suspecting the cause. But, should they change their grocer or omit the tea-drinking, their nerves improve, and should a normal person stay with them to drink their tea, it will often induce in this person a more or less nervous condition. There is also a profound condition of nervous prostration sometimes produced by tea or coffee. There is great lassitude of body and there may be an inability to make any muscular exertion, which is quite abnormal and does not occur when this particular variety of tea or coffee is not taken. In other instances there is an undue excitability of the nerves to stimuli producing great excitement, and the condition may spread to the motor nerves, producing a jumpiness of the muscle tissues. It is as if the nerves were 'on edge.'

Thinness and stoutness depends upon the diet, and upon the age and habit of the person taking that diet. Aches and pains, neuralgia, sciatica, lumbago, can be caused by some articles of diet. There is a substance which can produce great coldness of the hands and feet—it is frequently a cause of chilblains in children; and, on the other hand, another substance, which produces a great burning sensation of the hands and feet. It is clear here that two substances of opposite effects are present in the diet. Sleeplessness and headache are the result of diet—butter, milk, cheese, are frequently found to be the cause, as well as alcohol.

All digestive disturbances must clearly be caused by the irritation of certain articles of diet which produce the disturbance. Lamb and potatoes have produced pyrosis sometimes, bread dyspepsia, and other articles of diet flatulence; whilst the same articles at other times and other places have not produced these disturbances. Hence, it must be due to some abnormal constituent in the food. Similarly, acne rosacea and lupus erythematosus, or the butterfly mark across the nose and cheeks, has been induced in previously healthy persons by certain articles of diet, which disappear when the diet is altered by residence elsewhere.

Tenesmus of the rectum, with bearing-down pains in the uterus, have occurred for two or three days in people who do not usually suffer from these disturbances.

Hæmorrhage from the bowel and stomach, and hæmorrhoids, have occurred in a similar way, as the result of diet or alcohol.

Some kinds of fruit are capable of producing a foul breath, or a painful reddening of the fauces, within a few hours of their ingestion, which conditions do not occur when these articles are not taken; but at once recur if they are again eaten.

A great aching of the testicles, corresponding to the pain of varicocele, has followed a particular meal, and has not occurred at other times.

There are a large number of stimulating compounds which occur in food, or beer, or wines, or spirits. They tend to increase the pleasure derived from the society of the opposite sex, and in some cases excite powerful erotic sensations, which produce much sexual irritation and burning. There is a substance which causes the eyes to sparkle, causes a desire for the society of the opposite sex, gives a sprightly appearance and manner, and some desire for sexual indulgence, but this is not marked or excessive. This is probably an excitant of the higher centre in the brain. It is the least objectionable perhaps.

There are other substances which act merely upon the lower centres in the spinal cord and produce much sexual irritation and eroticism, with a burning desire for sexual indulgence or relief of some kind. These substances are most objectionable and tend to cause erotic dreams and emissions, or masturbation, which may easily become a habit, and by excessive use cause much deterioration of the health. Some of these substances cause emissions during sleep, which, if frequent, may cause ill-health. Such substances should never be allowed in the food of the young of either sex, and it is most reprehensible for them to be given to young unmarried women. It is quite possible that the presence of such stimulating substances in the food of boys at school may lead to bad habits, or self-abuse, or actual sexual perversion. Sexual perversion is probably merely the formation of a habit of an act which at first was indulged in to obtain relief from such irritating sexual feelings which, had relief been obtained in the normal way, would never have become perverted, and which act would probably never have occurred at all but for the stimulating food taken. A vicious mental association may tend to cling to any act once performed, and in this way a habit of self-abuse may be started.

There are other substances which act merely upon the *nervi erigentes,* which are associated with the mechanism of the sexual act; these substances are active in both sexes.

No words of condemnation can be too strong for allowing boys or girls to eat food containing such stimulating substances. It produces a sexual precocity, or a condition of hyper-sexuality, in which any foolish act may take place. When boys at school are found to have contracted bad habits, it is more than probable that they have been eating such food, and more blame ought to be attached to the food than to the boys. The greatest care ought to be taken that no such food ever enters a school.

Some of these stimulating substances tend to cause an excessive amount of physical growth, if given to children, which probably occurs at the expense of the brain tissue. Such children tend to grow tall, but their brain power is often poor, and in some cases an attack of adolescent insanity has occurred, but this may possibly have been caused by other influences.

There are some substances which cause a great irritation of the sexual organs in children, with a bloody discharge from the vagina. Such children are often very small in stature, and have an aged cast of countenance and lead to precocity of manners. It is more than probable that this irritation may be a cause of sterility in women when they reach adult life.

There is little doubt that many of these substances act very powerfully upon the ovaries, and in excess tend to produce ovaritis with all its attendant pain, and other disturbances of health, and if persisted in may produce ovaritis or ovarian tumour; for ovarian tumour, like all other diseases, must have some cause, and ovarian tumour is mentioned in the Bible as being caused by drinking dirty water. Other substances produce bearing-down pains of the uterus and tend to produce displacement of that organ.

There are other substances which when taken destroy all sexual desire and produce a condition of impotence. Should such a substance be present in the circulation, it may prevent the sexual act being completed, although sexual desire may have been aroused by other stimulating foods. Should such stimulating toxins be present in the food, and in addition some substance be present which is capable of depressing the mental faculties, it is easy to conceive that such a person would become unaccountable for any act of foolishness which might be committed voluntarily, or on suggestion by some other person. And in this way a perverse sexual habit might be started, which it might be difficult to eradicate after once it is formed. Possibly some of the devils exorcised by the disciples were but the effects of such diets, for clearly such people would not be in the possession of their normal faculties.

Disturbances can be aroused in the cells of the respiratory tract, and such disturbances can be caused in definite and well-defined areas. For example, one toxin or poison can cause a discharge from the nostrils, another from the turbinal bones, and another from the naso-pharynx. The nature of the discharge in each case differs; from the nostrils it is a thin acrid discharge, from the turbinals a thicker yellow discharge, and a thick mucous discharge from the naso-pharynx. Another toxin can cause all the symptoms of bronchitis, with bronchitic sputum.

It is more than probable that adenoids are the result of a toxin or poison which produces a discharge from the naso-pharynx, and polypi are doubtless caused by the continual presence in the articles of diet of a substance which causes irritation and discharge from the turbinal region of the nose.

If all these complaints can be caused by the presence of toxins or poisons in the food, it is not unreasonable to expect that phthisis and pneumonia are in the same way, perhaps, caused by toxins or poisons in the food.

The influence of toxins upon the ear and auditory apparatus is most instructive. Various articles of diet or tobacco, containing various impurities or toxins, have the power of producing the following effects :

1. Ringing noises in the ear.
2. Singing noises in the ear.
3. Interference with the drum of the ear, which gives a crackling sound on swallowing or puffing out the cheeks.
4. Acute pain and swelling of auditory meatus, and hæmorrhage.
5. Contractions of stapedius muscle, with rattling noises.
6. Catarrh of middle ear and deafness.

There is little doubt that the other diseases of the ear are likewise caused by toxins in food, since so many different derangements can be produced.

The influence of certain articles of diet upon the eye is often seen—such conditions as the following occurring after certain articles of diet :

Swelling of the eyelids, followed by styes, tinea tarsi, meibomian cysts.

Suffusion of the eyeball, with intense injection of the vessels of the conjunctiva, with pain and irritation, rendering suppurative conditions likely.

Increase of ocular tension producing, in young children where the eyeballs are soft and yielding, a condition of buphthalmos, or stretching of the cornea; or, in older people, glaucoma, or errors of refraction, opacities of the cornea, corneal ulcers, or diseases of the retinal cells may occur.

Some articles of diet cause a running from the eye.

That these diseases are caused by diet rests, not only upon the evidence of the feelings of the people who suffer from them, but also upon the actions of animals who are given the same food.

Milk, when given to cats, has sometimes literally sent them 'off their heads'; they go rushing and careering all over the room and furniture, and up and down the house, as if in truth they were possessed of many devils.

Animals when fed upon the 'irritability' sample of food are prone to fight and quarrel with one another, and so the phase of disposition is reproduced in the animal world.

Possibly the swine mentioned in the Bible as rushing down a steep place into the sea, had been fed with food which contained some brain poison. The swine were certainly not in their normal state of mind, for it is not a usual thing for swine to rush into the sea, hence there must have been some toxin or poison present which disturbed and disorganised the decomposition of the cell protoplasm of their cerebral cells.

Dogs have suffered from disease of joints, which was at once cured by changing their diet, without any other treatment.

CHAPTER IV

SOME ORGANIC LESIONS

'Only a thread of silver, from locks that once were gold ;
Only a thread of silver, as a sign of growing old ;
Only a thread of silver, from a brow so broad and fair ;
But there's dawn, as well as twilight, in that thread of silver
hair.'

The structural defect of organic lesions shows the position and extent of the damage done to the cells, and it can be demonstrated and examined in suitable preparations of the diseased tissues. This has formed a firm basis on which to found a theory of the cause of disease, and but for the assistance that pathology has given, the study of Disease as a science would have been almost impossible.

Much can be learnt from the study of some of the minor organic lesions that occur. The hair upon the body varies very much in its quality and texture. It may, by disease, become discoloured or fail to grow. Here, again, the law that all cells of a similar composition are similarly affected by disease, or else certain tracts, corresponding to certain nerves, alone are affected, is well seen. The hair of the scalp may become entirely grey or white, or become so in patches only, often symmetrically, or it may become bald in the same manner ;

or its texture may become dry and harsh, or it may tend to split at the ends if the hair is long. This distribution of disease may be traced in the growth, colour, or absence of the moustache or beard, either as a whole or in patches corresponding to certain nerves. The absence or alteration of the hair of the rest of the body may also occur, but the changes are not so frequent as in the case of the hair of the scalp, possibly because the hair is of a stronger and more resistant growth. The variations in the strength and texture of the hair are merely the result of a corresponding variation in the chemical constitution of the cells which produce them, and this variation in chemical constitution would explain why one kind of hair was attacked and another was not by a toxin or poison circulating in the blood. Where nerve lesions influence the disease of hair a very curious effect may be produced: an eyebrow on one side may be whitened, all the eyelashes may become white, or a few lashes only (possibly because the process was stopped). That it is possible to control the colour of hair by diet is shown by the Bible stating that Jacob was able to make the sheep bring forth lambs with spots or without, by giving them certain kinds of food to eat. The precise lesion that is produced, whether discoloration or baldness, etc., depends upon the toxin producing it, and the distribution depends upon whether or not there is any nerve lesion or nerve irritation at the same time.

The teeth are also instructive, and the widespread decay of teeth calls for urgent attention being given to the causes of decay. Here, again, nerve influence can be traced in the way in which different sets of teeth are attacked, the upper incisors, and the upper and lower molars on one or both sides are frequently seen attacked. The teeth may be attacked by the ordinary process of decay or they become loosened and fall out, or suppuration may take place round the roots. Decay of the teeth is generally caused by bits of food, the decay starts on the outside and works its way in ; certain kinds of meat and sweets are very prone to cause this decay. The loosening of a tooth must be caused by a lesion of the nerve supplying that tooth, and must, therefore, be due to a toxin in the blood, probably absorbed from the diet.

Certain toxins contained in some forms of tobacco and cigarettes, and in some kinds of meat, have the power of producing toothache should the nerve be exposed. Such a toxin is evidently a nerve irritant and, probably, a nerve destroyer, for the pain lasts very persistently, and if such a toxin were absorbed into the circulation it would doubtless cause destruction of nervous tissue. This result must be compared with the blindness which sometimes occurs as the result of tobacco smoking, and with the fact that some smokers suffer from lesions of the spinal nerve cells.

Another instance of the direct injury caused by food is seen in the cankers which occur in the mouth. They are deep, small ulcers, probably caused by the lodgment of an irritating morsel of food upon the gums or lips. Some sweets have the power of causing a soreness of the mouth, and it is probably a similar substance which causes cankers. These sweets when broken in the dark, are seen to emit a flash of light, and the broken ends glow with a soft phosphorescent light. It is highly probable that such a morsel of food, should it reach the stomach, would have the power of causing an ulcer on the stomach wall, and of producing a perforating ulcer, which in size and appearance resembles the canker seen in the mouth.

The difference in the structure of the cells of the mucous membrane of the colon, and those of the Peyer's patches of the smaller intestine, are sufficiently marked to point to wide difference in their chemical composition. The regularity with which these different structures are attacked in dysentery and typhoid, and the spread of the disease to almost the whole of the colon, or all the Peyer's patches, seems to point to the probability that there is a toxin or poison in the food, which is specially able to attack these cells in preference to others. Both diseases are frequently caused through drinking dirty water, and it seems probable that the bacilli connected with the disease graft themselves upon the injured tissues, as scavengers or devourers of the damaged cells. They are probably attracted to the seat of injury by the chemiotoxis of the toxin, which causes the injury. The difference in the chemical composition of the two classes of cells is quite sufficient to account for the selective action of the two toxins, without the interference of any nervous derangement, and the injury would then be a direct action upon the cells in contact with the toxin or poison in the dirty water.

One of the most perfect examples of this selective action of toxins is seen in the way various toxins or poisons in alcohol have the power of picking out different groups of nerve cells and their fibres.

1. The various groups of the upper set of cells and their fibres connecting them by dendrites with other nerve cells.

2. The lower set of motor cells and their nerve fibres in the spinal cord.

3. The lower set of sensory fibres receiving direct sensations from the outside, and their sense organs.

The different groups are frequently seen to be picked out by disease from the others which escape injury.

The picking out of certain nerves is still more remarkable, and it may perhaps be explained by ganglions on their course, which are irritated by sensations received from some source of irritation elsewhere in the body; *e.g.* a source of irritation in the mouth or nose might influence the paralysis of a muscular nerve in the face, with which it was in close nervous connection (*cf.* Ptosis).

The presence of lupus erythematosus and acne rosacea on the face must clearly be due to the irritation of the nerves supplying the regions of the skin of the face attacked, just as the glossy skin of leprosy is due to a nerve lesion. And in each instance it is due to a toxin or poison, which picks out that particular nerve, or nerves, for which it has the greatest chemical affinity. That it is possible for this selective action for a particular nerve to belong to a particular toxin is seen in the case of blisters upon the great toe, which arise in some people after certain articles of diet, without any change in foot-gear to cause them; or the appearance of raised bumps in identically the same position on the same side of the forehead in several persons taking the same diet. It is an extreme instance of the selective action of a toxin.

The chemical composition of the appendix is clearly different to that of the rest of the intestine, and it is quite possible that appendicitis is caused by some toxin which has a direct selective attraction for the cells of the appendix, which, becoming damaged and congested, are afterwards attacked by bacteria.

Similarly, there are toxins contained in tobacco, or in butter, or other articles of diet, or even in the fumes in the air (*e.g.* of candles), which are capable of exerting a selective action upon the cardiac action or muscle, causing its degeneration and slight dilatation. There are other toxins in food, which cause a raising of the arterial tension, and should these two toxins occur together, or succeed one another, there is a resulting great dilatation of the heart.

Various blood diseases, scurvy, and anæmia, are no doubt influenced by improper and insufficient diet. And it is highly probable that pernicious anæmia will be shown to be also due to impurities in the food or air.

How do the adrenal bodies or the kidneys become diseased? It cannot be due to chill, else both these organs would be attacked together, and great exposure to cold is frequently borne without any injury to either of these bodies. Diseases of the kidneys scarcely ever occurred amongst the soldiers in the South African War, and yet they were frequently exposed to rain and frost at night, without any tent to shelter them. These organs are not injured by bacteria, because no bacteria are found to be present in the tissues diseased. Both organs are seldom found to be diseased together, and the difference in their composition would be amply sufficient to explain why a toxin circulating in the blood would cause disease in one organ and not in the other; and there seems no other possible explanation for the cause of the disease than that it is caused by some toxin absorbed from the food or drink.

The question of the rôle of the tubercle bacillus, in the causing of phthisis and tuberculosis, is a very important one. One of the most prominent features of the disease is the thinness and loss of weight of the person suffering from it. But numerous people become excessively thin without suffering from phthisis. Hence thinness cannot be looked upon as a necessary result of phthisis, nor yet a necessary forerunner of the disease.

There are five chief forms in which tuberculosis occurs in the human body:

1. Intestinal. Occurs chiefly in children fed upon tuberculous milk.

2. Of lungs. Generally attacks the apices first: two varieties, (*a*) rapidly fatal form; (*b*) slow chronic form.

3. Of lymphatic glands. Those of the neck frequently attacked.

4. Miliary or General. Attacking all organs of the body without distinction.

5. Of joints or bones. Elbows or knees, etc.; bones of extremities, etc.

If the lymphatic variety is considered, it is found that those glands which are attacked by the tubercle bacillus have been previously injured or damaged by the absorption of septic material from some wound or injured tissue, such as a decayed tooth, and are only secondarily attacked by the tubercle bacillus. The presence of giant cells in a young tubercle group show that, in addition to the presence of the bacillus, there is some profound change taking place in the tissue elements themselves, which is quite unlike the behaviour of tissue cells in other microbic diseases. Where the disease spreads to other glands, they are in direct communication with one another, and therefore with the primary cause of the first injury, whatever that may have been. In many cases the disease remains confined to those glands, and does not spread to healthy tissues, either of the lungs or elsewhere. Hence there is no tendency shown for the bacillus to attack healthy tissues, although it has gained a footing in the body.

If the healthy lung tissue is not attacked, although there are bacilli elsewhere in the body, why should the healthy lung tissue be attacked, at another time, when there is no such primary focus? There must be some other determining cause than the mere presence of the bacillus, and that determining cause must exist in a damaged or altered condition of the cells of the apex. And such altered condition must be brought about, either by some toxin or poison circulating in the blood, or else present in the air. The same protection of other tissues against attack from the tubercle bacillus is seen in the way in which the disease tends to limit itself to a particular focus, often for a very long time, such as a psoas abscess, a tubercular joint, or a tubercular bone. Why should the bacillus attack any one particular focus to the exclusion of all others so frequently? The reason must be sought in some change of the tissue in question, which renders it vulnerable and liable to attack.

Again, why do some cases of phthisis die in a few weeks, and others linger on for many years? It must either be due to the tubercle bacillus existing in two forms, one a dangerous form, and the other a less dangerous form, or it must be due to an injury of the tissues rendering them more vulnerable. Now, again and again we see instances of injured or damaged tissues being attacked, not only by the tubercle bacillus, but by many other bacilli, and the weight of evidence points very forcibly to the conclusion that no tissue is attacked by any bacillus, unless it is previously damaged in some form or other. This fact renders it more probable that the rapid decay in one instance, and the slow decline in another, is produced rather by varying amounts of the toxin or poison, which is the primary cause of the disease, than by the sole presence and influence of the tubercle bacillus. Numerous instances of the occurrence of disease without the intervention of bacteria can be brought forward, where the tissues are organically injured; but no instance of bacterial infection can be brought forward without the presence of injury amongst the tissues attacked, although the same bacteria are frequently found lying harmlessly upon healthy tissues. It must be remembered also, that disease of the apices of the lungs can occur without the tubercle bacillus ever being found in the sputum, which closely resembles phthisis in its symptoms and physical signs.

Some clue as to the causation of phthisis may be gathered, perhaps, from the heavy mortality from this disease amongst tin-miners, potmen, and bakers, whilst coal miners scarcely suffer from the disease at all.

It is known that there are toxins or poisons which can affect joints and bones (*cf.* Gout and Rickets), and the fact that tuberculosis frequently focuses itself in one joint or one bone points to the presence of some toxin which has previously injured the tissues, either directly or by the influence of disordered nerve control, or blood supply, or all three causes combined. Certain kinds of diet have the power of causing pain in the joints of the elbow and knee, and it is probable that disease of these joints is preceded by some such toxin before tuberculosis commences. Where direct mechanical injury, such as a severe blow or a sprain, has preceded tubercular disease, this may be sufficient cause to determine the seat of election for the disease; but it is highly probable that, unless the toxin also is introduced, no tubercular disease would follow. Otherwise, all such cases of mechanical injury would be followed by the same effect, and they certainly are not, for the same mechanical injury is frequently followed by a large variety of different diseases. Hence the effect produced does not depend solely upon the mechanical injury, but also upon some superimposed cause, that determines what kind of disease will follow the injury, which merely locates the *site* of the disease.

Lastly, why does tuberculosis sometimes become miliary? Since the evidence points to the fact that tubercles only occur in damaged tissues, the only explanation is that there must be some toxin in the blood, which is capable of producing a widespread degeneration of the tissues, and that upon these foci of degeneration the tubercles graft themselves, and the toxin itself causes death. This is borne out by the fact that the miliary tubercles are always small, and of recent growth. This particular toxin encourages the growth of the tubercle bacillus, and the difficulty in obtaining cultures of this bacillus on artificial media may possibly be explainable by the absence of this particular toxin.

In leprosy a bacillus, closely resembling the tubercle bacillus, is found; but it is distinguished from it by the fact that it arranges itself in the interior of lepra cells, in a very definite and characteristic manner. Its staining reactions are identical with those of the tubercle bacillus, and in form and structure they are similar. The question arises, Are they the same bacillus, found under different circumstances? Now, in leprosy, one of the lesions that occurs is a degeneration of the nerves, leading to the glossy skin of lepers. And since nerve degeneration proper is always due to the presence of a toxin and not of a bacillus, the cause of the nerve degeneration in leprosy must, in all probability, be the result of some such toxin, not of the bacillus. Since some of the lesions in leprosy are the result of a toxin, is it not logical to assume that they are all the result of this toxin, either directly, by action upon the tissues, or, probably more likely, by indirect injurious action, through the influence of disordered nerve control, which, leading to an unhealthy condition of the cells, allows the lepra bacillus to get a footing? There seems little objection to the theory that the lesions of tuberculosis and leprosy are caused by two different toxins, which both have a chemiotoxis for the tubercle (or lepra) bacillus, which in the one case enters the cell, and in the other arranges itself amongst the cell debris.

The influence of the various toxins in diet or tobacco is well seen in some of the affections of the auditory apparatus, and the knowledge gained in those cases where we know the cause should influence our opinions where the cause is obscure.

Now, cancer is a problem of the greatest intricacy and difficulty. Only the most salient points can be briefly dealt with. It presents all the characteristics of a foreign body growing amidst the tissues of the rest of the body cells, which it pushes before it and destroys by pressure, gaining as it goes its own blood supply, which is not more remarkable than the new blood supply developed in the healing of a surgical wound. The cells of which it is composed always closely resemble, and are entirely analogous to, those of the body cells, but they differ from them often in size, and in their mode of performing fission. The karyokinetic figures are those of reproductive cells, and not those which usually occur in the reproduction of somatic cells. The growth of a parasitic hydatid might be compared to the growth of a cancer; they are both equally foreign bodies in the tissues in which they occur.

Secondly, cancer usually occurs late in life, when the cells are becoming senile, and their efforts at fission or reproduction are not as active or as perfect as they were. Maupas has shown in the ciliata that conjugation, during the later senile stages of the life-cycle of a cell, does not normally take place, but should it do so, the resulting efforts at fission are abnormal, the cells produced being mis-shaped, or ill-formed, or incomplete. Now, in many respects, cancer cells are the product of the abnormal divisions of one of the body cells. It is as if some influence corresponding to conjugation in the ciliata had started this cell upon a new and abnormal life-cycle, the product of whose cell divisions produces the cancer growth, which proves destructive to the cells in its immediate vicinity from the pressure exerted upon them.

Thirdly, the most frequent sites of cancer in woman are the uterus, breast, and stomach. The cause of cancer then is most prone to attack the primary and secondary sexual organs, and after that the stomach. This would suggest that the cause of cancer was some toxin or influence, whose most powerful action was upon the sexual organs, and secondarily upon the stomach. In other words, it suggests that it is some substance which passes through the stomach, and after absorption is capable of exerting a powerful action upon the sexual organs, both primary and secondary. This suggests that it is some toxin contained in food, as we find is probable in so many other diseases. This probability is still more pronounced when it is considered that there are a large number of substances capable of acting upon the sexual organs, some of which are capable of producing ovaritis or ovarian tumour, or increasing the activity of the testicular cells.

Cancer has, at different times, been attributed to a large number of different articles of diet.

The spread of cancer has been attributed to the distribution of separate cancer cells, from the primary focus by the blood stream, and to an actual continuity of cells from one growth to another. In all cases the primary and secondary growths resemble one another in structure.

CHAPTER V

SOME SUGGESTIONS FOR PREVENTION

'Non divide et impera sed unitate impera.'
'Audi alteram partem.'

If a book on Materia Medica is studied, it is seen that there are an immense number and variety of drugs which have a well-marked and well-defined action upon the cells of the body, some beneficent and some harmful. It is seen that some of their actions counterbalance one another in effect, but in no case is the action of one drug exactly the opposite of another drug. Each drug has its own separate action upon the cells which it influences, and although the effect may be altered by the administration of an antidote, it is never quite nullified; in other words, no drug has an exact antidote, and, if two drugs are given, they probably both exert their own action independently, although the ultimate result to an organism may seem very small.

There are many drugs which have the power of inducing sleep, but if they are given to overcome the effect of some toxin in alcohol, which is producing sleeplessness for example, the sleep resulting does not give the same amount of rest, as if the sleep was procured naturally.

Similarly, coca-leaves have the effect of inducing great powers of muscular endurance, but it is probably not an exact antidote to that impurity which sometimes occurs in food, and produces great muscular prostration and weakness.

There are some substances which improve the hearing, and others which depress it; but both probably act in different ways. Those which produce deafness, by creating a catarrhal otitis media, cause a degeneration of the cells in the middle ear, and it is highly probable that, in excess, it might cause a destructive lesion, and so open the way for attack by bacterial scavengers.

Now, eserine has the power of diminishing the ocular tension, and so it is not surprising to find, in glaucoma, that there is some body present in the course of the disease which has the power of raising the tension.

Just as phenacetin and its associated drugs have the power of lowering the bodily temperature and of depressing the cardiac action, it is not surprising to find that, in acute pyrexial diseases, such as pneumonia, a toxin is present which increases the temperature, and stimulates the heart's action. But it is acknowledged that these drugs are not a direct antidote to the poison of pneumonia, and owing to their depressing action are now rarely given.

Hence the treatment of disease by drugs is not strictly scientific, since, although they may be useful at critical times to tide over dangerous periods of an acute disease, they do not act as exact antidotes, and the disease probably acts upon those cells which it is attacking, despite the administration of drugs. A far more scientific method is to increase the elimination of the toxins produced by the disease, by increasing the eliminative powers of the kidneys, of the skin, and of the lungs, and by removal of the contents of the bowel with regularity, or by surgical means if such a process is indicated, as in the case of a foul collection of decomposed tissue contained in an abscess. But a far more scientific method is by the prevention of disease ever occurring in the body at all. Every disease must have *some* cause, whatever that cause may be, and if the causes of disease are never allowed to come to the organism, that organism will remain in a state of health. Just as surgery was greatly improved when it was discovered that antiseptics could overcome the power of micro-organisms to cause suppuration, and became almost perfect when it was discovered that cleanliness or asepsis alone could prevent suppuration, without the aid of antiseptics, so the time has come for aseptic medicine. Too long have medicines been used as antiseptics were in surgery. The time has now come to prevent the causes of disease ever reaching the body, and not to try to nullify their effects by the administration of drugs, which may themselves cause harm.

Our water, our food, our beverages, our milk, our atmosphere must be purified and carefully watched. Impurities are apt to find their way into food from dirty methods of production, or from decomposition, and dangerous antiseptics are added, often in enormous amounts, to assist in their preservation and nullify the want of cleanliness in their preparation or handling. Even harmless antiseptics, such as boracic acid, have been added in such enormous amounts as to cause serious poisoning in persons taking the milk containing this antiseptic. And where more dangerous antiseptics are used by careless and unskilled persons, a very slight excess may cause serious harm. It should either be made unlawful to use antiseptics at all, or, if they are used, they should be used only in strict moderation, and the kind of antiseptic used and its amount should always be stated upon the article of food. Cleanliness and purity of food should take the place of antiseptic methods, which encourage carelessness and dirty methods.

Every article of food or drink should be carefully watched, not by one medical officer of health, but by every medical practitioner acting under the supervision of the medical officer. Every disease should be notifiable, and should be watched by a committee of medical men of the town and reported, not directly perhaps to the Medical Officer of Health in the first instance, but first of all to those medical men who have charge of that particular disease, and their report should be sent to the Medical Officer of Health. Every establishment where food or drink is sold should be under the supervision of one or two medical men. A medical expert should be attached to every milkman, every baker, every grocer, and every butcher, who should hold himself responsible for any disease which may arise from any food coming from that shop or establishment, and should at once take steps to prevent any further sale of any infected articles, or, as far as possible, prevent them being eaten, if they have been sold.

The tenure of office by the Medical Officer of Health should be made much more secure than it is at present. The remuneration should be more liberal and more in keeping with the salaries that are paid in other professions. Salaries of £100 per annum are not an adequate reward for the services of a highly trained and scientific man. There is a want of combination and cohesion amongst the medical profession, which is a great source of weakness, and adds greatly to the difficulties of adequately resisting the inroads of disease. It should be the aim of the medical practitioner to maintain health, and to prevent rather than to cure disease. Families should be attended from time to time during health, when the first departures from health should be noted, and the cause at once sought and as far as possible eliminated; and steps should be taken at once to prevent the spread of the disease amongst other people. Medical practitioners should be friends and not rivals. They should strive for health and not for patients. Their services should be adequately and generously remunerated, and their efforts should be spent in trying to maintain the health of the people. Whilst medical men compete with one another for the possession of patients, proper combination is impossible. A scheme might easily be devised whereby medical men were paid fixed salaries on a sliding scale. The health of the nation certainly suffers through the want of a proper combination and organisation amongst medical men. There is a large army of highly trained and able practitioners, some 30,000 strong, who, if they were only united and properly organised, should soon be able to eradicate at any rate all serious diseases. Disease is unnatural, and every disease has a cause, and it should be the aim of the medical man to fight that cause, rather than fight the disease. If disease is preventible, then it ought to be prevented; but the prevention of disease is impossible without proper combination and organisation of our medical forces. The general practitioner should be linked up more thoroughly with the public health forces. The Public Health Act of 1875 gives the Medical Officer of Health the power to 'inquire into the causes of ill-health in his district,' and in no way limits his powers to the supervision of zymotic disease, although extended and increased powers of supervision are given in these cases.

It is quite clear that the majority of our diseases are spread by impurities in our food, and although it may be difficult to ascertain the precise nature of the impurity which is the cause of the disease in question, it is a much more simple problem to say that a certain disease is due to the consumption of a certain article of diet, and at once take steps to prevent its spread or recurrence. Perfect as surgery is to-day, the time will come when the operations of surgery will become unnecessary, and the art of surgery will be looked upon as one of the relics of the bygone barbaric times of the nineteenth century.

Not only should food and drink be under careful supervision, but all articles should be watched. Conditions of disease may arise from clothes, wall-papers, carpets, candles, gas, coal, as they may give off emanations deleterious to health of body or mind, or both.

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